Executive Summary

Enhancing the socio-economic standards of rural farmers by upgrading their knowledge and skills is the main objective of transfer of technology. Acquisition and application of technology does not stand alone, but is conditioned by political, social, economic, and cultural factors that can impede the diffusion or transfer of technology. One of the major concerns in the transfer process is how to disseminate effectively new technologies considering the viewpoint of farmers, particularly in addressing the questions of where, how, and what technologies are appropriate to a given socio-economic milieu.

2. Agricultural innovations and diffusion of new technologies are important factors for all developing countries like India in their quest for food and nutritional security. Farming in different resource endowments must be sustainable, economical, and intensive in order to provide dependable, long-term support forrural households. To achieve these, farmers must have access to sustainable technology in crop, livestock, forestry, fisheries and other agri-related sectors. The Indian Council of Agriculture Research (ICAR) has established a network of 642 Krishi Vigyan Kendras (KVKs) across the country with an aim to conduct technology assessment, refinement and demonstration through various activities. In view of the changing scenario of agriculture, the activities of KVKs need to keep pace to address newer challenges in the areas of climate change, market led extension, mechanization, agri-business and so on. It is to be ascertained if the new technologies are percolating to the ground level. Are farmers inclined to accept new inventions? Are these changes becoming accessible to farmers and helping them in any way and how effective is the role of KVKs in meeting these goals, are some of the questions to which ICAR is seeking answers through this study awarded to the Institute of Applied Manpower Research now known as NILERD functioning under the aegis of NITI Aayog, Government of India.

3. The specific objectives of the study are:

- Studying the efficacy of KVKs‟ services, both in public and private KVKs.
- Assessing KVKs in terms of infrastructure and human resource.
- Assessing the impact of new knowledge and practices on farmers‟ farming practices.
- Assessing the impact of new knowledge adoption by farmers on their incomes and improved quality of life.

4. The study has been conducted using a mixed methodology approach where quantitative data has been collected through structured questionnaires administered to KVKs, and an interview schedule for farmers of various sampled states and districts, supplemented by qualitative data collected through individual interactions and focus group discussions (FGDs) with various stakeholders such as experts, scientists and other officials of Government and community organizations, farmers and their family members. This impact evaluation design has been found beneficial in bringing out focused results for the study.

5. Stratified random sampling has been used to select States and KVKs. The country has been divided into five regions: North, South, Central, West, East/North East. One state from each region has been selected on the basis of random sampling. Thus a total of five states were selected for primary survey and from each state, a sample of 10 KVKs has been selected (12 in Madhya Pradesh) on random basis after distributing the total sample among Government, SAUs and other KVKs approximately proportionately ensuring that all types of KVKs are covered. In Arunachal Pradesh the number of KVKs is small (only 13) and that too all are government KVKs. Therefore, 50% sample (6 KVKs) was chosen for primary survey in the state. To assess the impact of KVK‟s technology dissemination about fifty farmers from each selected KVKs district have been interviewed. In all, 48 KVKs (2 KVKs gave the information voluntarily) and 1,870 farmers could be covered by the study.

6. It is important to mention that although efforts have been made to select a comparison group of farmers who are totally unaware of the new technologies or developments in agriculture with whom farmers with access to KVK technologies (beneficiary group) could be compared, it was almost impossible to select such a farmers‟ group totally unaffected by KVKs because of the operation of both internal (learning from fellow farmers) and external (dissemination by agencies other than KVKs) contamination factors.

7. A conceptual framework has been developed in terms of Theory of Change to understand the process of change that was expected to lead to the observed impacts, validate results and provide a systematic framework for analysis of results.

8. Report contains a total of 8 chapters. Chapter 1 relates to the Indian agriculture and KVKs. Chapter 2 details the present study its objectives, methodology adopted and coverage. Chapter 3 describes various techniques of impact evaluation with suitability of chosen

technique for this study. This chapter also mentions a conceptual framework of theory of change. Chapters 4 and 5 provide detailed analysis of inputs received from KVKs and farmers respectively and Chapter 6 indicates the outcomes of the detailed interactions with Government officials, representative of NGOs, farmers‟ organizations and farmers and other experts in various villages of the sampled districts. This chapter contains KVK-wise interaction outcomes as most of the KVKs covered in this study requested that the report should reflect their respective achievements and problems. Chapter 7 presents highlights of results and these results are discussed in the light of theory of change and previous studies. Chapter 8 puts forth key recommendations.

9. Some of the highlights of the results from the inputs given by KVKs and farmers are:

- Objective 1 of the study had been to study the efficacy of services. KVK is doing only frontline extension activities and it may not reach out larger percentage of farming community. KVKs are responding well to requests from farmers for information. However, response in dealing with the requests relating to demonstrations is to the extent of only 40%. KVKs felt that rich farmers, those with secondary or higher education and those whose landholdings were comparatively large were more likely to implement new technologies. KVKs carry out activities as per the broad guidelines for adopting villages and keeping in mind the resources. It has come to light that generally they cover the villages for their mandated activities in their close vicinity and villages in remote and far- flung areas remain uncovered. The KVKs under NGOs have moved faster than others. Generally KVKs are involving other agencies in their activities.
- About one-fourth of the farmers covered were not aware of the existence of KVKs or their activities, especially those with low farm holdings and low education. In the absence of any other criterion, this group of farmers which did not display any awareness of the activities of KVKs was taken as the comparison group for this study. Farmers generally were of the opinion that KVKs had very limited outreach. This finding may be seen in the context of KVKs mandate as they are only front line demonstration system.
- The results on objective 2 show that KVKs are short of staff and required infrastructure. A high percentage of vacancies are there in SAUs and there are more

vacant positions in Maharashtra and Rajasthan. There are also problems relating to insufficient and untimely budget.

- Objective 3 of the study relate to transfer of technology and its adoption. The results show that average number of technology transfer is 7.5 per year by each KVK and about 64% relate to crop science and 21% to horticulture. About 40% farmers implement the technology immediately while others in next season or after seeing the results. 42% of the technologies adopted resulted in higher productivity and about a third in enhancing incomes, one-fifth of the technologies reduced drudgery. Comparison group got information from fellow farmers indicating the spill over effect of technology transfer by KVKs
- More than 50% farmers have mechanized their farm operations; the ownership of farm machinery increased with size of holdings; families involved in both agriculture and non-agriculture activities have better incomes as compared to those involved with agriculture only. The role of fellow farmers was found important in spreading new technology.
- About 80% farmers reported modifications in their agricultural patterns after intervention of KVKs which were related to diversification of crops and changes in cropping pattern, and use of fertilizers and pesticides, and some farmers reported changes in machinery used and in water use pattern.
- The technologies relating to systematic cultivation process, seed planting technique, water management, integrating farming system, feed management, and proper use of chemical fertilizers were reported as having been beneficial to the farmers.
- A much larger proportion of the farmers in the beneficiary group (93.7%) had changed their farming methods during the last five years than the comparison group (62.7%). Several farmers who responded to the query on increased production and incomes reported at least 10% increase both in production and income after KVKs‟ intervention.
- The results on the objective 4 show that a larger percentage of farmers in beneficiary group reported an increase of 20% or more in incomes and production as compared to comparison group indicating the positive contribution to farm incomes through KVKs‟ technology transfer. Enhanced incomes are spent in construction of house, better education and health for family and better inputs for agriculture; some improper

use of enhanced income has also been observed. A large proportion of farmers in beneficiary group changed their farming practices than the comparison group showing the influence of KVKs .

- KVKs have an edge in technology transfer over other service providers by virtue of their having better technical expertise and demonstration units.
- Most of the KVKs were of the opinion that a number of technologies were gender sensitive and had helped in reduction of drudgery, income enhancement and developing self-confidence among women thus making them empowered.
- Some factors that hamper technology transfer and adoption include difficulty in getting suitable technologies, non-availability of any backup of technology if required by farmers and the inability of KVK scientists to provide them suitable alternatives, lack of input delivery system and availability of planting material and other farm inputs on the part of KVKs. Poor socio-economic status of farmers and small holdings, non-availability of low cost technologies, lack of forward and backward linkages especially post harvesting management, marketing and value addition etc. are the factors that hamper technology adoption on the part of the farmers. This is the view of the farmers. However as per mandate, KVKs activities are limited to assessment and demonstration of technologies. Any need for newer technologies are communicated to the research system as a feedback thereby acting as a link between research and extension. It is to be considered if KVKs activities could be expanded to take into account the needs of the farmers.
- About 25% time of KVKs is devoted to each of the non-mandated agricultural activities and non-mandated non-agricultural activities.

11. Results according to Theory of Change framework indicate that from inputs to activities and activities to outputs there is a direct causal link in the activities of KVKs which indicates the „attribution" connect. From outputs to outcome the study indicates that KVKs are playing an important role in achieving the outcomes as a main contributing factor. When the impact of the interventions of KVKs has been determined, a number of influencing factors have been found to play their role. There had been intervening factors like floods, droughts, etc. that influenced intended impacts. Results have also been discussed in the light of results of the other studies in the related areas.

12. The study has brought out certain areas which require further researches to make the technologies more effective and efficient as per local needs; for instance, research is needed for short duration varieties of crops that can withstand the vagaries of nature or seeds that require less irrigation due to scarcity of water, research on cutting the cost of production, suitable equipments for small farms and hilly regions and so on.

13. Recommendations and action points have been outlined in two broad sections detailing major themes in each section. The first section relates to improving performance of KVKs within their existing mandate and the second section contains suggestions for a vision for future.

14. Recommendations for improved performance by KVKs within the current mandate relate to infrastructure and resources, flow of technologies from lab to KVKs, outreach of KVKs, non-mandated activities and issues relating to certain policies. Some of the major recommendations are that there is a need to strengthen KVKs in terms of all types of resources; a uniform procedure for transfer to technology from research labs to KVKs at fast pace; measures to be adopted to increase the outreach of KVKs by adopting innovative techniques (forming farmers groups, train farmers-trainer, redefining cluster approach, continuous interaction at village level, need based training, use of ICT, etc.), exempt KVKs from unproductive duties and re-look into the existing policies regarding providing subsidies, capacity building of KVK staff, regulatory authority for distribution of inputs, etc.

15. Recommendations regarding future vision relate to KVKs as resource centres, operation, implementation and coordination, farmers‟ needs and KVKs role in transforming rural India. These include development of KVKs as resource centres on farm technologies; technology transfer should come as a complete package covering backward-forward linkages; modernization of soil testing labs; defining responsibilities of each organization involved with transfer of technology; keeping the farmers‟ needs in focus while providing training; focus upon new emerging areas like climate change, pro-harvest management and non-farm activities.

16. KVKs can play an important role in transforming rural India. Interventions of KVK should target the family and not the individual farmer which is a guiding principle of KVKs. KVKs should come out of „inside the wheel‟ approach and should also cater to the needs of

small and marginal farmers with innovative mind sets. A number of farmers are doing various innovations that should be taken a note of. There is a need for following bottom-up approach also and researches done at field level should also reach to laboratories for validation. As such KVKs approach is to encourage farm innovators and documenting success stories and to follow inclusive approach. Some KVKs are doing very well in this direction while others may give more emphasis may be given to these aspects while working at field level.

To sum up, the study leads to the observation that KVKs are playing a pro-active role in transferring new technology at field level and with beneficial impacts, but a lot is yet to be done. It is high time that KVKs are strengthened and their mandated activities are reviewed from time to time and expanded in the light of the present day needs of rural India. Here it is also necessary to mention that some of the recommendations are out of the purview of KVKs and objectives of the study team but these have been mentioned as they came to light during the study and are important to make KVKs work effective.